CLAIMS

1. A continuous process for the desulfurization of gaseous streams containing H_2S, comprising, according to the scheme provided in Figure 1:

(a) - feeding to the bottom of an absorption column (RC) operating at room temperature and at a pressure normally ranging from 1 to 1.2 Atm, a gaseous stream (1) containing H_2S at concentrations ranging from 10 ppmv to 99% vol/vol;

- feeding to the same column a liquid stream (2), removed from the bottom of a biological reactor (RB), containing a solution of ferric/ferrous sulfate with total concentration ranges of iron of 0.1-0.5 M and molar ratios within the range (100:0 up to 60:40), with pH values within the range of 1.40-1.90;

- streams 1 and 2 being fed in such quantities that the ratio in moles between the H_2S and ferric iron ranges from 1:20 to 1:4;

(b) - extracting the gaseous stream (3), purified of H_2S, from the head of the absorption column RC, together with a stream (4) consisting of a solution of ferrous/ferric sulfate in which the concentration of the Fe^{2+} ion ranges from 0.025 to 0.15 M, in which elemental sulfur is suspended in the form of crystalline particles with an average particle size higher than 70

μm at concentrations within the range of 0.1-5 g/l;

(c) - feeding said stream (4) to a filtration system;

(d) - extracting from the filtration system a limpid stream (5) consisting of a ferric:ferrous sulfate solution in a molar ratio within the range of 80:20-40:60, at total iron concentrations ranging from 0.1-0.5 M and pH ranges of 1.90-1.50;

- extracting a solid stream (6) with a sulfur content of 50-70% from the filtration system;

(e) - resuspending in a stirred reactor the solid stream (6) of raw sulfur in a quantity of water equal to the overall amount lost by evaporation from the process and feeding the suspension thus obtained to a filtration system;

(f) - extracting from the filtration system a limpid stream (7) consisting of a solution of ferric:ferrous sulfate and a solid (8) consisting of sulfur at 98-99.5% of purity;

(g) - feeding stream (9) obtained by mixing streams (5) and (7) containing ferrous sulfate, ammonium hydroxide and ammonium phosphate, to the top of the biological reactor (RB), consisting of a trickle-bed containing an acid-resistant carrier colonized by *Thiobacillus ferroxidans*, in the quantities necessary for maintaining the concentrations of the above salts within the

ranges of 0.1-0.5 M, 1-10 mM, 0.2-2 mM, respectively;

(h) - feeding to the bottom of the biological reactor a gaseous stream (10) consisting of air or air enriched with O_2/CO_2.

2. The process according to claim 1, wherein the chemical absorption reactor RC consists of a bubble column.

3. The process according to claim 1, wherein the concentration of the Fe^{2+} ion in stream 4, is 0.10 M.

4. The process according to claim 1, wherein the solution of ferric:ferrous sulfate contained in stream (5) can be either fresh or recycled, coming from the RC section.

5. The process according to claim 1, wherein stream (5) contains ferrous sulfate at a concentration ranging from 0.025 to 0.15 M.

6. The process according to claim 1, wherein streams 1 and 2 are fed in such quantities that the ratio in moles between the H_2S and ferric ion is 1:5.